IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	:	**Confirmation No. 1632**
Norio KIMURA et al.	:	Attorney Docket No. 2001-0660A
Serial No. 09/864,208	:	Group Art Unit 1763
Filed May 25, 2001	:	Examiner Jeffrie R. Lund
SUBSTRATE POLISHING APPARATUS AND SUBSTRATE POLISHING METHOD	:	**MAIL STOP: AMENDMENT**

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
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Sir:

I, Norio KIMURA, hereby declare the following:

1. I am a co-inventor of U.S. Patent Application Serial No. 09/864,208;

2. My educational background is as follows:

I have a degree in Engineering which was conferred upon me by Seikei University in Tokyo, Japan, in 1982.

3. My professional background is as follows:

I have been employed by Ebara Corporation since 1990 and I have a total of 14 years of work and research experience since 1991 in the field of polishing technologies.

4. The present invention involves a method as claimed in each of independent claims 16, 23 and 41 as now presented and amended. Each of the claims is directed to a method of polishing a substrate that has both a first metal layer and a second metal layer that is formed under the first metal layer. With reference for example to Fig. 2 of the application, a substrate is moved from a load/unload portion 1-1 to a polishing section 10/11 of the polishing apparatus. The first metal layer is then polished using a polishing surface and a first polishing fluid in the polishing section.

During the polishing of the first metal layer, a polishing end point of the first metal layer is detected using an end point monitor that is disposed within the polishing table in a polishing section of the polishing apparatus. After the end point monitor has detected the end point of the polishing of the first metal layer, the polishing surface is cleaned by supplying water to remove the first polishing fluid on the polishing surface. The second metal layer is then polished, after the cleaning, using the polishing surface and a second polishing fluid.

A polishing end point of the second metal layer is detected with an optical film thickness monitor that is disposed within the polishing table during the polishing of the second metal layer. After the end point of polishing of the second metal layer has been detected, the substrate is moved from the polishing section to a cleaning machine in the apparatus. The substrate is then cleaned with a cleaning machine, and dried.

The substrate is then moved, after the drying, to a dried condition film thickness measuring device which is disposed outside of the polishing section. A film thickness of the substrate is measured using the dried condition film thickness measuring device. After the measuring, the substrate is moved to the load/unload portion.

5. The present invention thus involves three different measuring or detecting steps. There are two separate steps in which a polishing end point for the respective first and second metal layers is detected, using the end point monitor, and using the optical film thickness monitor, respectively.

As is emphasized in each of the independent claims, the end point monitor and the optical film thickness monitor are disposed within the polishing table. This type of arrangement can for example be seen from Fig. 8 of the application. A film thickness measuring device 10-4 is illustrated in the polishing table for use as an endpoint monitor. An optical film thickness measuring device 10-15 is also shown. When placed in a polishing table, these types of thickness monitors can be referred to as in-situ monitors. The advantage of monitoring the film thickness in-situ is that information can be provided regarding the film thickness while the film is undergoing the removal process itself. However, because the in-situ monitor is disposed in the polishing table, it cannot provide information about the entire area of the wafer. Typically, it provides a scanning path across the wafer in accordance with the rotation of the wafer by a top ring and the rotation of the polishing table. Accordingly, the measurement precision of an in-situ

monitor can be considered to be relatively low as compared with a situation in which a much greater number of points on the wafer are sampled to determine film thickness.

Accordingly, it can be said that an in-situ monitor has a relatively low measurement precision, but allows the time for measurement to be relatively short.

6. In the present invention, after the substrate has been cleaned and dried, it is moved to the dried condition film thickness measuring device located outside of the polishing section. The film thickness of the substrate is then measured after the cleaning and drying. This type of film thickness measuring device, disposed outside of the polishing section, can also be referred to as an in-line monitor. Partly because the in-line monitor is not part of the polishing table, it is not limited to the scanning path of the in-situ monitor. A much greater number of sampling points can be taken, accordingly. However, the required time for measurement is necessarily longer than the in-situ monitor. The in-line monitor is for example shown by reference number 13 in Fig. 2.

7. In the method of the present invention, by performing the detecting of the polishing end point of the first metal layer and the second metal layer using detectors within the polishing table, conditions for determining the polishing end point can be predetermined, and it can be readily determined when the respective layers have reached the polishing end point. This is because the in-situ monitoring allows detection of the film thickness during the actual polishing. However, as discussed above, the measurement precision is relatively low. Accordingly, it may from time to time be necessary to adjust the target end points of the detections of both the first and second layer polishing steps.

By measuring the film thickness of the substrate after the substrate has been cleaned and dried, it can be determined whether adjustments may need to be made to the target end points of polishing in both the polishing of the first metal layer and the polishing of the second metal layer. Thus, the measuring of the film thickness of the substrate using the dried condition film thickness measuring device can allow for a type of feedback to be provided to the in-situ end point monitors from the in-line monitor.

The ability to provide information that enables feedback to the endpoint monitor and the optical film thickness monitor can allow for greater precision in the polishing of the first and second metal layers of the substrate. To maximize the efficiency of the method overall, the

measuring of the film thickness with the dried condition film thickness measuring device does not have to occur for every substrate that is polished in an apparatus. For example, it might be done with every other substrate, or every third substrate, as a check on the accuracy of the end point monitor and the optical film thickness monitor.

I further declare that all statements made herein of my own knowledge are true, and that all statements on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Norio KIMURA	Feb. 13 '06 Date